

# Operating Manual

Analytical Balance

CX 165

CX 265

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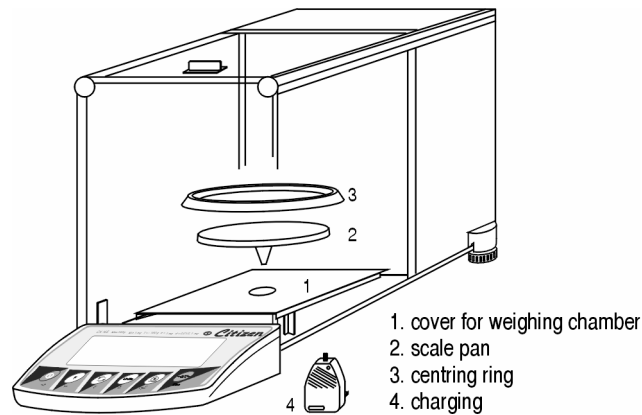
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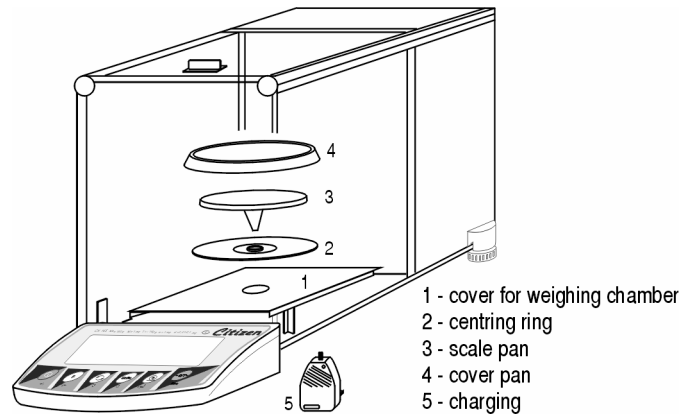
## 1. UNWRAPING THE BALANCE

### 1.1. The balance CX series

Take the balance out of the box. Remove the protection foam. Set the balance on stable table. Take all components out of the box.



Draw 1. The components installation for the balance with  $d=0,1mg$

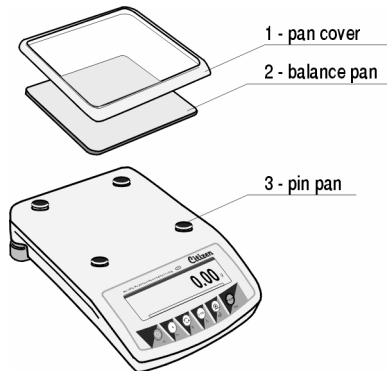


Draw 2. The components installation for the balance with  $d=0,01mg$

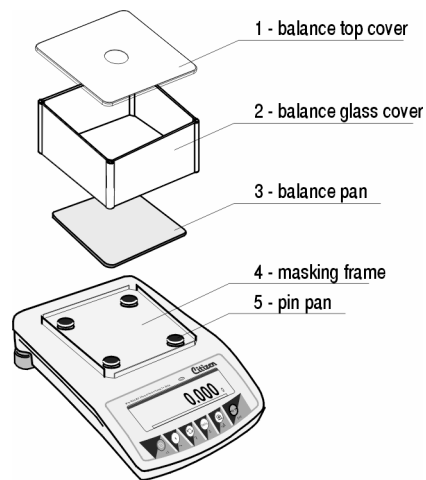
After installation all elements slide the glass shields and plug the balance. The balance is supplied through the power adapter. The socket is in the rear of the balance. The balance is supplied through power adapter 230 V AC / 10,5V AC.

## 1.2. The balance with $d=0,001g$ and $d=0,01g$

Take the balance out of the box and put in on the stable table. Take all components out of the box. Install the components on the balance.



Draw 3. The components installation for the balance with  $d=0,01g$



Draw 4. The components installation for the balance with  $d=0,001g$

The balance is supplied through power pack 230 V AC / 10,5 V AC. Power pack socket is at the rear of the balance.

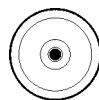
## 2. START THE BALANCE UP

### 2.1. Conditions of proper usage

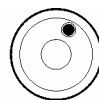
- Set the balance on stable table, far from vibrations
- The balance should be replaced far from draughts and air breeze.
- The balance should be in stable temperature and humidity room
- The balance should be replaced far from sources of
- Temperature in the room  $+15^{\circ}\text{C} \div +30^{\circ}\text{C}$  (balances with  $d=0,001\text{g}$  and balances with  $0,01\text{g}$ )
- Temperature in the room  $+18^{\circ}\text{C} \div +30^{\circ}\text{C}$  (CX series)
- Humidity in the room  $45\% \div 75\%$ .
- If the static electricity has influence on the balance indications it base should be earthed. Earthing screw is in the rear part of the balance base.
- The balance should be replaced in leveled position

### 2.2. Set level up

The balance should be leveled. The correct leveling is shown on the level indication installed at rear of the balance.



level - OK



level incorrect

### 2.3 Warming up

Before measurements user should wait until the balance reaches temperature stabilization. It is warming up time.

For analytical balances CX warming-up time is about 1 hour and for balances with  $0,001\text{g}$  and  $0,01\text{g}$  it is about 15 min.

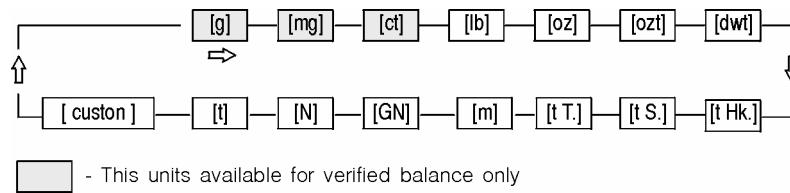
This periods refers to the balances which were in surrounding temperature (work) before start weighing.

If the CX balances are kept in lower temperature before weighing the warming-up time is about 8 hours and for balances with  $0,001\text{g}$  and  $0,01\text{g}$  it is about 2 hours. During warm-up stabilization the indications can change.

### 3. APPROPRIATION

The balances are used to do precise measurements in laboratories. It is possible to do the zero function in all measure range.

The balance weights in following units:



Draw 5. Measure units

Apart from weighing in various measure units the balance also:

- counts pieces
- weights
- dosages
- determines deviations of the standard mass
- weights animals
- detemines liquids and solids density
- makes mixtures in relation to recipes
- creates statistics

Measure units and particular functions can be inaccessible for user. It is possible to adapt the balance to individual needs and access functions and units which are necessary at this moment.

It is possible to define accessible or noo-accessible in user menu and it is described in further part of the manual.

## 4. DESCRIPTION OF THE BALANCE

### 4.1. Graphic display



Draw 6. Display balance

1. load mass and quantity of pieces
2. measure unit
3. the result is stable
4. line of max range of the balance
5. work mode
6. date
7. time
8. precise ZERO

### 4.2. Keyboard

Each key is dual-function key. Particular function can be done through. User also can move in the balance menu.



Switches the display off.



Function key.



Selects the work mode



Changes measure units



Sends information to external instrument (PRINT) or confirms parameter value or function (ENTER).

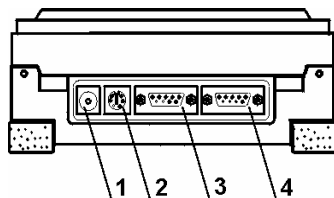


Sets indication to zero

Esc



### 4.3 Connections



1. power adapter socket
2. PS keyboard connector
3. RS 232 port
4. additional display socket

Draw 7. Sockets of the WPX balance

### 5. USER MENU

There are 9 groups in user menu. Each group is named by P letter. Name and contents of each group is presented below.

#### P1 Calibration

01	internal calibr	* * * * *	Function
02	external calibr	* * * * *	Function
03	user calibr	* * * * *	Function
04	Test calibr	* * * * *	Function
05	weight correction		0.0
06	automatic calibr		3   both
07	Aut. Calibr time		3   3 hours
08	Report printout		1   on

#### P2 GLP

01	User	Nowak Jan	
02	Project	AR – 65/04	
03	time printout		0   off
04	date printout		0   off
05	User printout		0   off
06	Project printout		0   off
07	Printout Id		0   off
08	Calibration printout		0   off

#### P3 Date/Time

01	Form date		0   D/M/R
02	Form time		0   24 hours
03	Time	* * * * *	Function
04	Date	* * * * *	Function
05	Display time		1   on
06	Display date		1   on

**P4 Readout**

01	Filter		3   middle
02	refreshing		1   0.1 s
03	Autozero		1   on
04	last digit		1   always

---

**P5 RS - 232**

01	Transm. speed		1   4800
02	Parity		0   none
03	Data bits		2   8 bits
04	Stop bits		1   1 bit
05	Transm data		0   none
06	Aut. printout		0   none
07	Interval		1   * 0.1 s
08	Min. mass		4   10 d
09	Print stab		1   enabled
10	Print to		0   printer

---

**P6 Printout**

01	Numer Print		0   standard
02	Print 1 start		1
03	Print 1 stop		1
04	Print 2 start		1
05	Print 2 stop		1
...	.....		
10	Pr. Edit		* * * * *   function
11	String 1		
11	String 2		
...	.....		
89	String 80		

---

**P7 units**

01	Grams		1   enabled
02	Miligrams		1   enabled
03	Carats		1   enabled
04	Pounds		0   disabled
05	Ounces		0   disabled
06	Ounces troy		0   disabled
07	Dwt		0   disabled
08	Taele Hk.		0   disabled
09	Taele S.		0   disabled
10	Taele T.		0   disabled
11	Momms		0   disabled
12	Gran		0   disabled
13	Newtons		0   disabled
14	Tical' e		0   disabled
15	user unit		0   disabled
16	factor unit		1

**P8 Work modes**

01	countign pieces		1	enabled
02	weighing		1	enabled
03	Dosage		1	enabled
04	Deviations		1	enabled
05	Weighing animals		1	enabled
06	Density		1	enabled
07	Recipes		1	enabled
08	Taele Hk.		1	enabled
09	Taele S.		1	enabled

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**P9 Inne**

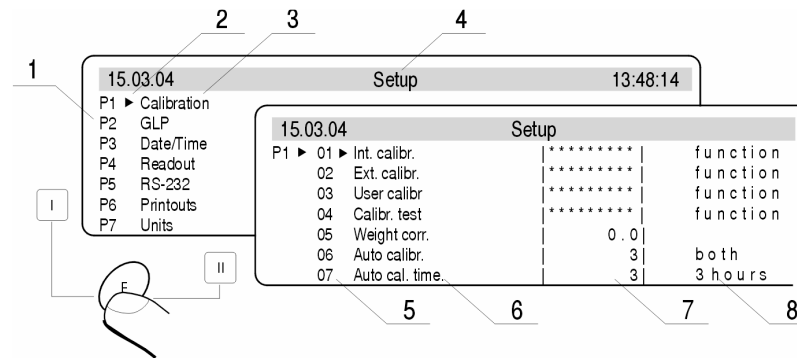
01	Ustawieno ID	* * * * *	function
02	Print Aut. ID		0   off
03	Signal		1   enabled
04	Language		1   english
05	Backlight		1   on
06	Contrast	* * * * *	function
07	Screen server		0   enabled
08	Temperature	* * * * *	function
09	Balance numbe	114493	
10	Program number	MBa.a 23	
11	Printout par.	* * * * *	function
12	Parameter reception	* * * * *	function
13	Password protection	* * * * *	function

**Parameters in user menu are:**

- functional – for particular activity eg. the balance calibration
- selectable – selects one of few values from the balance memory
- noted – changes sets in the balance memory eg. Date, time, user number, texts

## Menu – graphic version

Press the **F** key to display main menu of the balance (display I). Select the submenu whose contents is displayed after pressing the **F** key (display II).



Draw 8. Menu

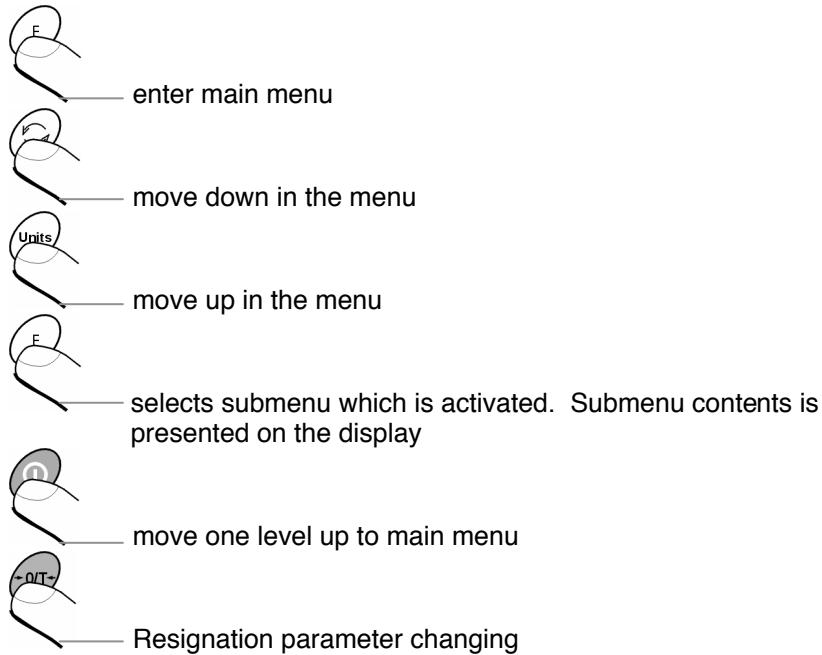
- 1 – main menu number
- 2 – indication of the function selection
- 3 – function name
- 4 – currently used function
- 5 – submenu number
- 6 – submenu name
- 7 – attribute of the menu
- 8 – value of the attribute

## 5.1. Move in user menu

User moves in the menu by

- the balance keyboard
- PS keyboard,
- Communicates from computer to the balance

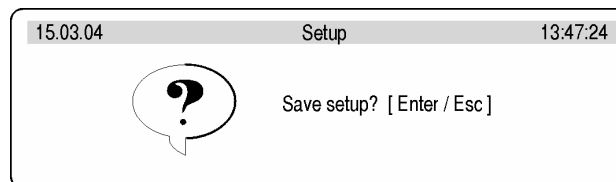
### 5.1.1. The balance keyboard



### 5.1.2. Return to weighing function



Introduced changes are recorded after return to weighing mode and confirm changes. Press the ESC key many times. If following question appears on the display press: ENTER – confirm or ESC – cancel















Draw 9. Return to weighing









### 5.1.3. PS computer keyboard

Each key on the balance keyboard has its equivalent on the PS keyboard:





#### - for functions

	Description	keyboard
	Switch on/off the balance display	
	Move to the balance menu	
	Selects work mode	
	Selects measure unit	
	PRINT	
	TARE	

#### - for direction keys

	Move up	
	Move to level up	
	Sets selected parameter	
	Move down	

- for ENTER / PRINT keys and ESC

	Confirm changes	
	Cancel and leave function without changes	 Esc

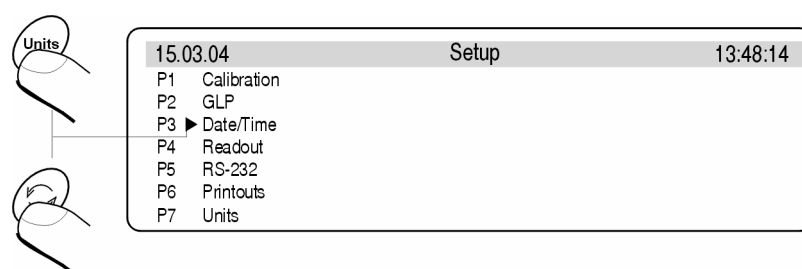
#### 5.1.4. By means of virtual keyboard through RS 232

Most of the functions are done by the balance desk or PS keyboard. They are also done by sending orders computer – balance.

This commands enables to move in the balance manu and control the balance work. The list of the commands is at the end of the manual.

#### 5.2 User menu

The menu is presented in p. 5. Press the F key in weighing level. Main menu is presented on the display. Select the submenu which is modified.

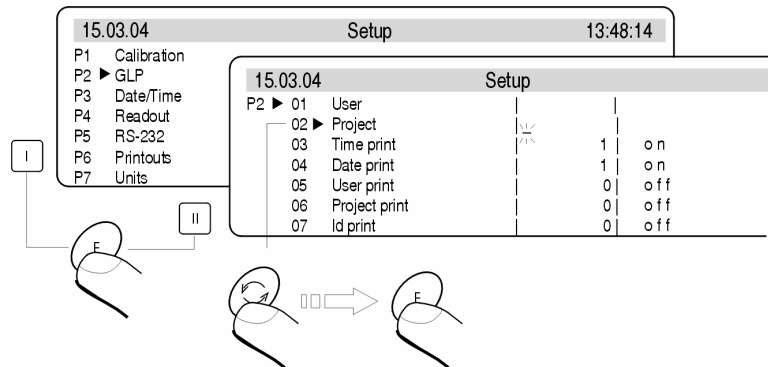


Draw 10. Main menu – submenu selection

If the menu is modified press the **F** key. Selected menu appears on the display. Select what will be changed in this submenu (activate). Select through keys presented on the Draw above. Press the F key.

Reaction of the balance:

- Activity of the balance (eg. the balance calibration) is done for submenu described as Function
- Attribute activation for submenu which is indicated (digit flashing means the value can be changed and some signs can be written)



Draw 11. The balance submenu



## 6. WEIGHING

Following conditions must be fulfilled to get reliable results:

- Stable temperature
- Stable ground
- Proper parameters for external conditions

- 1 Before measurements or for essential changes of the external conditions (if the temperature changes more than 1°C/h) calibrate the balance in accordance with p. 7.1.
- 2 Before measurements load the pan and check if the balance show „precise zero“ – displayed  $\rightarrow 0 \leftarrow$  in down left corner of the display (only if the parameter P4 06 Autozero has the value 1: yes) and check if the measurement is stable –  $\blacksquare$  is displayed in right up corner of the display. If the balance does not show zero press the key



- 3 If the conditions are unfavourable (no stable result) lines appear on the display. After settled time the balance returns to weighing mode without set up to zero. In this case wait until the conditions stabilize and press **Esc** again
- 4 By the **Units** key select measure unit. Put the load on the pan and after stabilization read out the result. If measure unit user wants to use is not displayed during pressing the **Units** key check if it has access attribute.
- 5 The indication can be set to zero many times. Sum of loads noted in the balance memory cannot be higher than max capacity.
- 6 Between following measurements do not unplugged the balance. The balance should be switched off by the **ON/OFF** key. After pressing the key again the balance is ready to work without warm stabilization.

## 6.1. Log-in function

The operator has own access code to internal menu. The password system is defined by administrator. Password can contain max 6 digits.

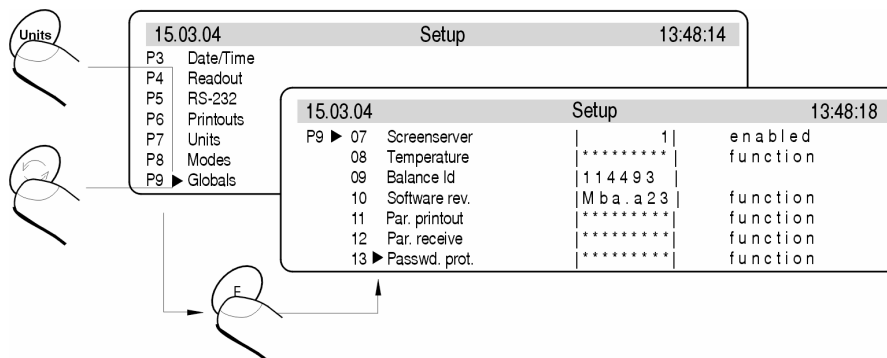
### The balance program enables to declare:

- One administrator who is authorised to use all sets and programme functions, change the passwords – own and user
- One user who is authorised to sets and the balance functions determined by administrator

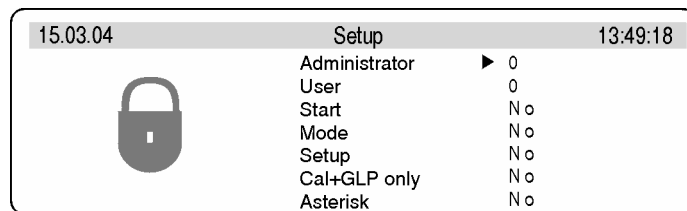
### Setting password and access authorization

- After set the password and access parameters (parameter P9 13 Password protection) write the password for administrator
- If the administrator password is different from "0" the program wants administrator password during enter for the parameter P9 13 Password protection.
- Every enter this parameter the software demands administrator password, after writting correct password it is possible to set the parameter P9 13 Password protection
- Dependly on setting the password is shown as digits or stars (start value each digit = 0)

According to p. 5.1.1 of the manual enter the menu **P9 Inne**



Draw 12. Password – activation the function



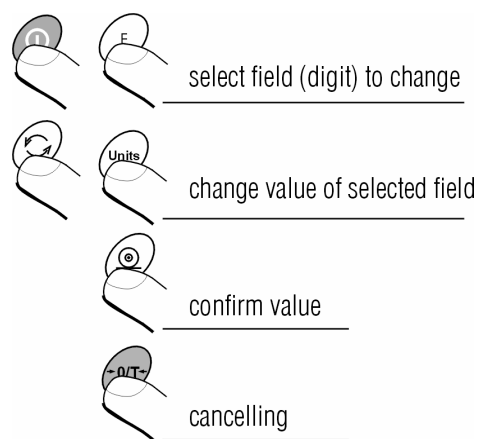
Draw 12-1. Menu password protection

- **Administrator**  
line to write administrator who has access to all set up
- **User**  
line to write user password. User who has access to setting with NO attribute (are not protected by password)
- **Start up**  
If it is settled on YES during start the balance up user must write access password (administrator or user)
- **Functions**  
If it is settled on NO (not protected by password) user can use implemented functions in the balance.
- **Set up**  
If it is set up on NO (not protected by password) user can change setting in the balance
- **Only Kal+GLP**  
If it is set up on YES user can perform the calibration and calibration report
- **Stars**  
If it is settled on YES during start the balance up password is hidden under starts

#### Administrator password

Write the password for administrator (max 6 digits) and user. Each administrator has access to all functions in the balance. User has access to balance possibilities in accordance with above description. Please, remember the password. If you set YES for „Start up” function the password must be written after switch the balance on.  
If the password is not correct using the balance is not possible.

To write the password in use keys described on the drawing 2. or PS/2 keyboard (it can be connected to the balance port).  
Set up the attributes for other options dependly on authorizations for user.



Draw 13. The keys – introducing the values in the menu

## 7. BALANCE CALIBRATION

To ensure high precision of weighing corrective factor in relation to standard mass must be noted in the balance memory periodically – it is the balance calibration.

### Calibration should be performed when:

- The weighing is started,
- Long breaks are between following measure series
- Temperature inside the balance changes more than: 0,8°C for CX (0,3°C for balances with  $d=0,01\text{mg}$ ) and 3°C for other balances

### Kind of calibration:

- Internal automatic calibration
  - \* started if temperature changes
  - \* started if the time changes
- Manual internal calibration
  - \* started by the balance keyboard
- Calibration made with external weight
  - \* with declared mass which cannot be modiflicated
  - \* with any mass which should be given before the calibration process

*In verified balances only automatic internal calibration and manual internal calibration is accessible.*



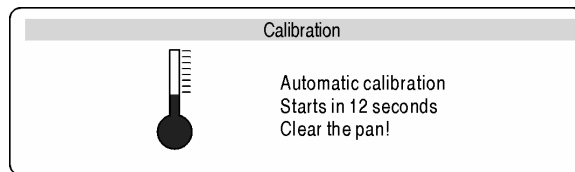
Perform the calibration when there is no load on the pan!

## 7.1. Automatic balance calibration

It is performed when:

- Period of time passes from last calibration
  - temperature changes for settled value by manufacturer
- \* for balances CX is 0,8°C,  
\* for other balances is 3°C.

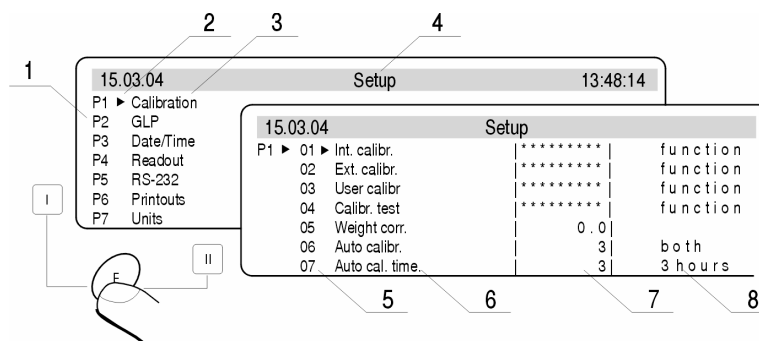
Following information appears on the display:



Draw 14. automatic calibration – display

Time delay in starting the calibration up enables user to yesse load off the pan untill the measurements are performed. If the T/O key is pressed the calibration process is stopped.

### Set up automatic calibartion



Draw 15. Set up automatic balance calibration

- 1 – main menu number
- 2 – function selection factor
- 3 – function name
- 4 – name of actual activity
- 5 – selects factor to autocalibration (time / temp.)
- 6 – declaring autocalibration time
- 7 – value of factors for autocalibration
- 8 – value of time for autocalibration

if the values for factor and autocalibration time also descriptions for tchem changes (on the drawing field No 9. and No 10.)

**01 Internal calibration**

Start internal calibration process, the process is automatically without operator interference, if there is load on the pan the display shows order to remove the load

**02 External calibration**

calibration performed by external mass, its value is recorded in factory menu, function inadmissible in verified balances

**03 User calibration**

calibration performed with any mass which must be introduced before the calibration, function inadmissible in verified balances

**04 Calibration test**

comparison internal calibration mass with its value recorded in the balance memory

**05 Weight code**

correct value of internal calibration mass, function inadmissible in verified balances

**06 Automatic calibration**

determine factor which decides about start automatic internal calibration

0 non – non of the factors causes start of the calibration

1 time – calibration in relation to time determined in p. 07

2 temperature – calibration in relation to changes of surrounding temperature

3 both – calibration in relation to changes of time and temperature

**07 Automatic calibration time**

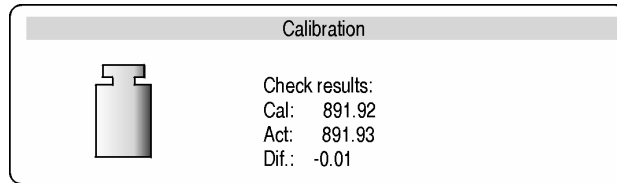
Determination of time automatic calibration starts up

**Return to weighing**

The changes are recorded when the balance returns to weighing mode with the recording the changes. Press the ESC many times. Following question appears on the display.  
Select one of the options: ENTER – record / ESC – cancell  
(see. Draw 9. Return to weighing p. 5.1.2. Return to weighing)

## 7.2. Calibration test

Internal calibration mass is compared to its value in the balance memory. This process is automatic. Its result is shown on the display.



Draw 16. The calibration test

Kal. – value of internal calibration mass

Akt. – result of weighing internal calibration mass

Odch – difference between two values

### Return to weighing



Changes are recorded only after return to weighing mode and confirmation the changes. Press the ESC key many times. Following question appears on the display. Select one of the options: ENTER – confirmation / ESC – cancel.

*(see. drawing. 9. Return to weighing. p.. 5.1.2. Return to weighing)*

## 7.3. Manual calibration

### 7.3.1. Internal calibration

1. Enter submenu P1 – Calibration.
2. Select the function 01 Internal calibration.
3. Press the F key.
4. The balance perform the calibration automatically. During this calibration do not load the pan.
5. After this process the balance records results of the calibration in the memory and returns to weighing mode.

- *Pressing the ESC key stops the calibration process*
- *If during the calibration load is on the pan display show order about error. The calibration process is stopped.*  
*After take load off the calibration process is finished.*
- *If the function DRH is active user cannot stop the internal calibration process.*

### 7.3.2. External calibration

The external calibration should be performed with external mass class:

- F<sub>2</sub> – for balances with d=0,001g or d=0,01g
- E<sub>2</sub> – for CX series (d=0,1mg or 0,01mg)

List of weights for separate balances is included in technical specification in the final part of the manual.

1. Move to submenu P1 – Calibration.
2. Select the function 02 external calibration
3. Press the F key.
4. Order to yes the load off the pan appears on the display (no load on the pan). After yesing load off the pan press the ENTER key.
5. The balance determines mass of empty pan
6. Put load and press the ENTER
7. After the calibration the balance returns to submenu P1 - Calibration
8. Return to weighing – as in the point 5.1.2.



If the function DRH is active user cannot perform the external calibration process. Function DRH is active in verified balances.

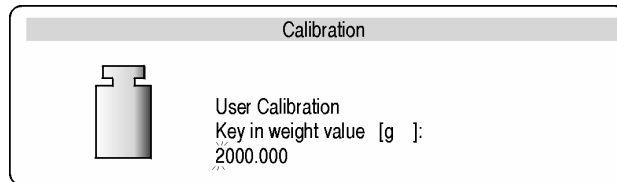


### 7.3.3. Calibration performed by user

Calibration performed by user with any external weight class:

- $F_2$  – for balances with  $d=0,001g$  or  $d=0,01g$
- $E_2$  – for CX series.

- Enter menu group P1 Calibration. Select the parameter 03 user calibration
- Press the **F** key. The balance displays order to note calibration mass. The first digit flashes and it can be changed.



Draw 17. User calibration – declaring value of weight

- Record new external mass by functional keys (in accordance with p. 5.1.1 of the manual)
- Confirm the mass. The balance starts calibration and shows orders on the display.
- The balance determines mass of empty pan and shows order to put this mass
- After put the weight on the pan confirm by the **Enter**.
- After this procedure balance returns to menu to group P1 Calibration.
- In accordance with previous point start weighing mode.



It is recommended to select external calibration mass as its mass would be about  $\frac{3}{4}$  of max balance capacity.



If the DRH function is active user cannot perform the external calibration process.

## 7.4. Calibration report printout

After calibration user can receive the calibration report. The report can be printed on connected printer and sent to computer or recorded in file.

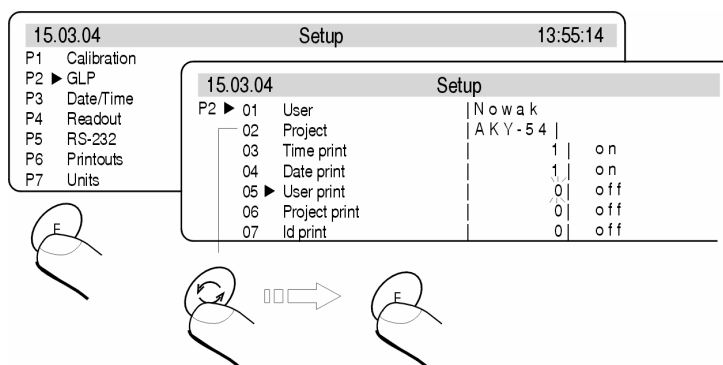
P1 08 Report printout : 1:yes – report is printed  
P1 08 Report printout: 0:no – report is not printed

If the parameter has the value 1 the report is generated and sent automatically.

15.03.04 Setup			
P1 ▶	02	Ext. calibr.	***** function
	03	User calibr	***** function
	04	Calibr. test	***** function
	05	Weight corr.	0.0
	06	Auto calibr.	3 both
	07	Auto cal. time	3 3 hours
	08 ▶	Print report	1 on

Draw 18. Submenu calibration

Contents of report depends on setting in submenu GLP. All options with YES attribute are printed.



Draw 19. Submenu GLP - setting

Apart from information settled in menu group the report contains: calibration mass remembered by balance after last calibration (description Old:), calibration mass determined during actual calibration (description: Calibration) and deviation of the calibration (description Deviation:) – difference between these two masses.

```

*** Internal calibration report ***
Date   : 16/04/2004
Time   : 15:24:39
Balance Id : 114493
Calibr  : 891.9[3] g
Old     : 891.9[4] g
Difference : - 0.0[1] g
User Id: Nowak
Project Id : AKY-54

Name .....

```

Draw 20. Example of balance calibration report

## 8. SETTING PRINTOUTS FOR GLP PROCEDURES

P2 GLP is group of the parameters which declares factors on the calibration printout. For fields:

- user (max 8 alphanumerical signs)
- design (max 8 alphanumerical signs)

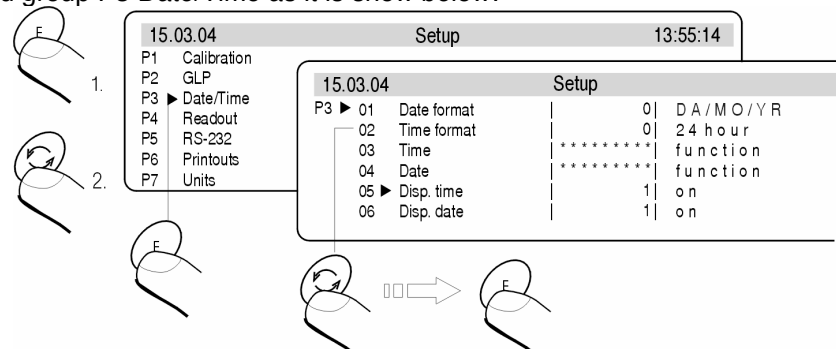
introduce names by the balance keyboard or the PS/2 keyboard. For the rest select:

- 1 no (do not print during report)
- 0 yes (print during report)

Main view of the GLP submenu is presented on drawing 19, page 24. If you use the PS/2 keyboard see what dependences are between the balance keyboard and PS/2 keyboard (p. 5.1.2)

## 9. SETTING TIME AND DATE

The balance has real time clock whose parameters can be modified. Enter the menu group P3 Date/Time as it is show below:



Draw 21. Submenu Date / Time

### 01 Date form

There are two possibilities:

- 1 format date Month/Day/Year
- 0 format date Day/Month/Year

After selection proper value confirm by the ENTER key.

### 02 Time form

There are two possibilities:

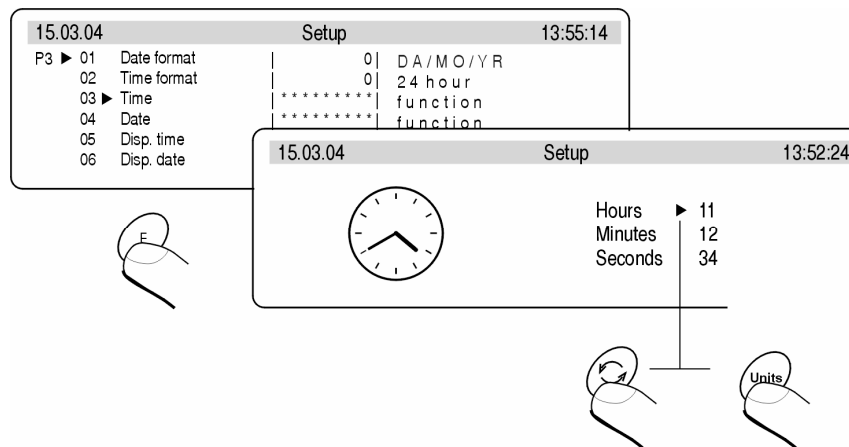
- 1 time form 12 h
- 0 time form 24 h

After selection press the ENTER to confirm.

12 h form is distinguished by the letters PM or AM on the printouts.

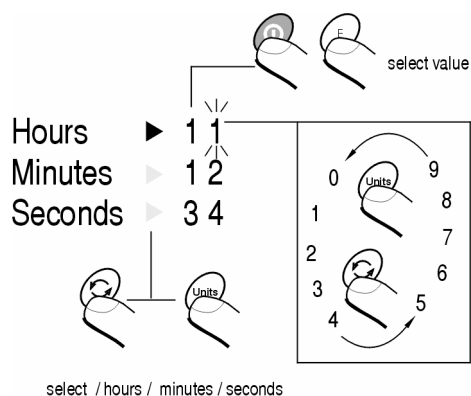
### 03 Time

Enter setting the parameter 03 Time by the F key in accordance with below scheme.



Draw 22. Submenu / Time – setting time

Replace the marker next to the value which will be changed (Hour, Minute, Second). Confirm with the **F** key. Change the numerical values with Mode and Units keys.



Draw 23. Submenu Date / Time – setting time – steering keys

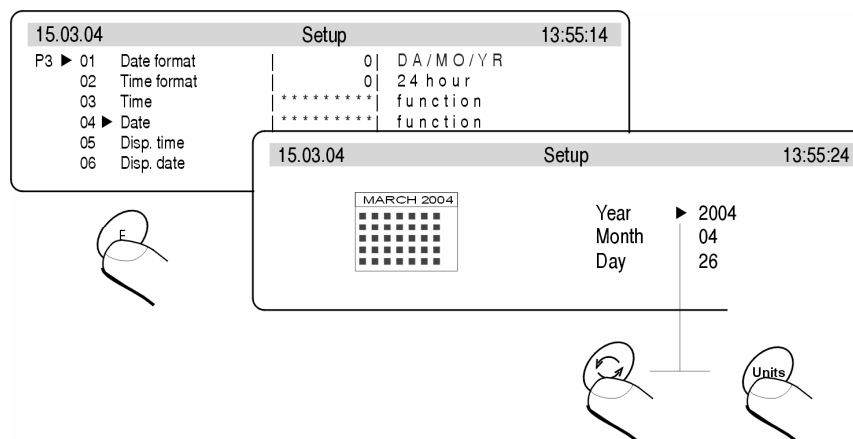
Confirm settled value (last change digit stops flashing)

Repeat above activities for following values. After setting new values for time press the ENTER key. The balance returns to submenu P3 Date/Time and displayed time changes.

After setting time return to weighing mode in accordance to p. 5.1.1 of the manual.

#### 04 Date

Set the parameter 04 Date with the F key. In accordance with previous description (03 Time) set actual date. After setting date return to weighing mode as it is presented in p. 5.1.2 of the manual.



Draw 24. Submenu Date / Time – setting date

## 05 Display time

for the value 1 – YES on top graph time is displayed, for the value 0 – NO, time is not displayed.

## 05 Display date

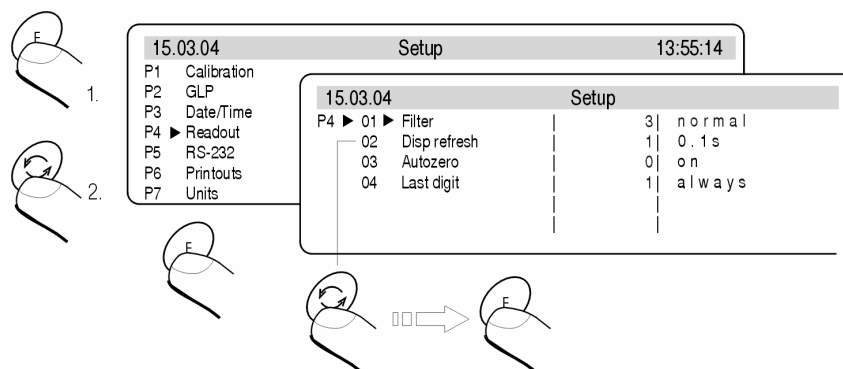
For the value 1 – YES date is displayed on top graph, for the value 0 – NO, date is not displayed.

## Return to weighing

(see Pict. 9. - 5.1.2. – Return to weighing)

## 10. SETTING THE PARAMETERS

User can adjust the balance to existing conditions (filter) and own needs (autozero, displaying last digit) by means of parameters in group <P4 Readout>.



Draw 25. Submenu Readout – internal setting

### 10.1 Setting filter

Dependly on conditions set the filter. If the conditions are conductive set the filter as very fast (value of the parameter 01 Filter 1) and if the conditions are bad (vibrations, draught) set the filter as slowly or very slowly (value of the parameter 01 Filtr at 4 or 5). Efficiency of filter is different for range of weighing. The filter works slower during getting to weighed mass. It works faster when mass is the settled filer range (parameter filter range accessed only from service menu – user does not have access).


## 10.2 Set the display refreshing time

This parameter determines period of time which the display refreshes in. Information on the display is compared to information which is sent by the balance processor about load on the pan.

For higher values of the refreshing parameter indirect not stable mass indications are not presented on the display during putting on and yesing off the load. For low values all changes in mass during weighing are visible – it enables to dosage liquids and solids. The refreshing time is settled in seconds.

## 10.3 Set autozero working

To ensure precise indications programmable function „AUTOZERO” is in the balance. This function controls automatically and corrects zero indication of the balance.

If the function is active following results in declared periods of time are compared eg. each 1s. If these results differs at less value than declared range AUTOZERA eg. 1 interval the balance sets to zero automatically and  and  $\rightarrow 0 \leftarrow$  appears on the display.

If the AUTOZERO function is active each measurement starts at precise zero every time. In special cases this function disturbs in the measurements eg. when the load is put on the pan very slowly (pouring substance). In this case correcting system of zero indication can correct also indication of real load mass.

AUTOZERA is switched on anr off in the parameter P4 03 in accordance with p. 5.1.1 of the manual.

15.5. Displaying last digit

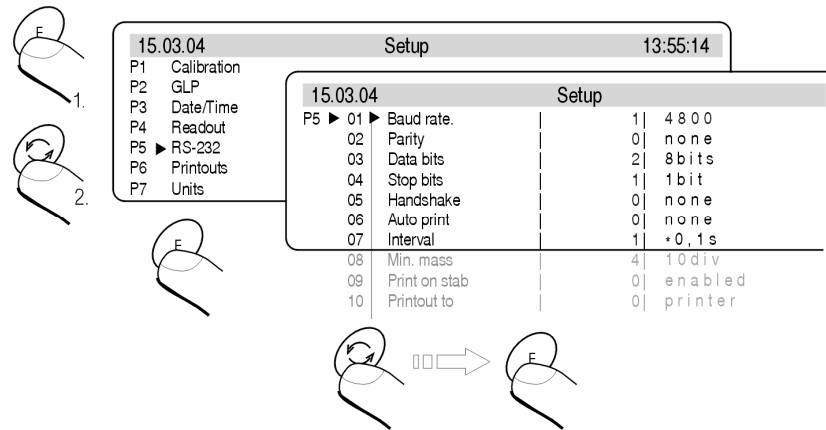
## 10.4. Last digit

To ensure komfort of work with the balance user determines (dependly on needs) if last digit should be displayed and when. One of the following values can be selected:

- 0     never
- 1     always
- 2     when stab

## 11. FUNCTIONS IN USING RS 232 PORT

User can set the parameters necessary for correct communication balance with computer or printer.



Draw 26. Submenu RS 232 - setting

Parameter No and name	Parameter value	Parameter No and name	Parameter value
01 Speed of transmission	0 : 2400; 1 : 4800; 2 : 9600; 3 : 19200	06 Automatic printout	0 : no; 1 : constance; 2 : with breakes; 3 : for stable.
02 Parity	0 : no; 1 : see; 2 : dont see	07 Interval	Interval it is defined how often balance sends indications through RS 232 port. It is counted on base on form for the parameter x 0.1 s = time yestu-interval). Value from 1 to 9999 can be written.
03 Date bits	1 : 7 bits; 2 : 8 bits		
04 Stop bits	1 : 1 bit; 2 : 2 bits	08 Print stable	0 : no; 1 : yes
05 Transmission control	0 : no; 1 : RTS/CTS; 2 : XON/XOFF	09 printout to	0 : printer; 1 : computer

After setting correct values return to weighin mode as it is described in p. 5.1.2 of the manual.

*For value 1 : computer parameter 09 Printout to, for printouts the last digit of indication is omitted.*



## 12. PRINTOUTS

This function is used to make not standard printouts and select type of printout. Precise description for printouts is described in p.17.

## 13. ACCESS TO MASS UNITS

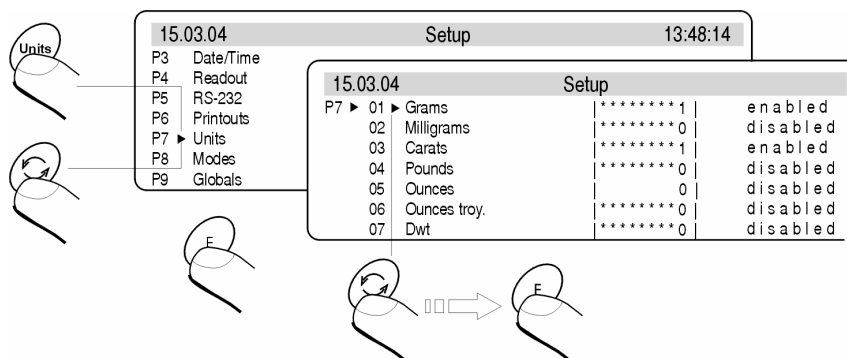
In this group of parameters user declares mass units which are accessible for operator directly under the key **Units**.

All units which value of the parameters is set up at 1: yes are accessible from the level of switching between units.

For units described as 09 Taele Hk., 10 Taele S., 11 Taele T . there are following dependences:

- If all of them have attribute 1: yes the balance show only first of them 09 Taele Hk

If the measurement is done in units 11 Taele T set the attribute 0 : no for two previous Enter group of the parameters P7 Units according to p. 5.2.7.

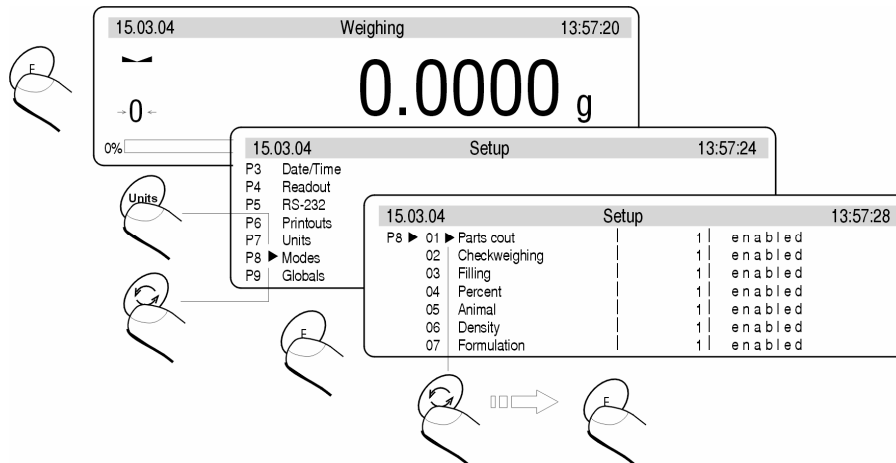


Draw 27. Measure units - setting

After set proper values of the parameters return to weighing mode in accordance to p 5.1.2 of the manual.

## 14. SETTING ACCESSIBILITY OF THE WORK MODES

In this group of parameters user declares work modes which are accessible for operator after pressing Mode key.



Draw 28. The balance functions - setting

All work modes values of the parameters are 1: yes are accessible from the level of switching between work modes. The changes of the parameters can be done according to p. 5.1.1 of the manual.

## 15. OTHER PARAMETERS

User can set parameters have influence on work with balance in group of the parameters P9 Others eg. beep signals etc. Enter submenu group P9 Others the same as in pakt. 14.

### 01 ID Setting

it includes 6 digits 6 codes which can be used during printouts for product specification, operator, batch etc.

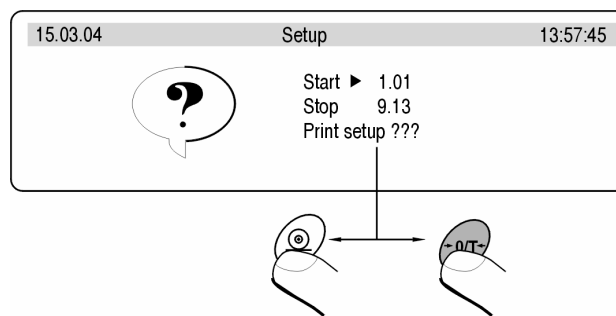
### 02 Aut. Printout ID

for the option YES all digit codes are printed, for option NO the codes are not printed.

### 03 Signal

beep signal for pressing keys

- 04 Language**  
selection of languages
- 05 Backlight**  
switch on/off the backlight
- 06 Contrast**  
changes contrast – after entering this function a window appears, by means of keys on the balance contrast on the display can be changed
- 07 Screen server**  
if the screen server is switched on displayed values disappear after settled time and if displayed value of the measurement does not change.
- 08 Temperature**  
it is information about temperature which is registered by temperature sensor in the balance. Return to the menu – press the ESC key
- 09 The balance number**  
it is only information about factory number of the balance
- 10 The number of the program**  
it is information about program number of the balance
- 11 Printout of the parameters**  
if the function is active the balance parameters in user menu are printed. User gives numbers of the parameters which should be printed.



*Draw 29. Submenu Others - printing setting*

After confirmation parameters are printed through RS 232 port, actually sent settled user parameters in the balance

## **12 The parameter reception**

If the functions are activated all parameters of the balance are received through RS 232. After reception the balance informs user how many parameters are accepted, how many are changed, how many were declared incorrectly and how many were not accepted by the software.

Printing and reception of the parameters is very easy and fast procedure of introducing new setting. After printing actual parameters to file in the computer user changes the parameters very fastly and without any problems. User sends new corrected setting to the balance software. After these changes the balance accepts new set up. User must know all parameters and computer operation very well.

## **13 Password protection**

this submenu contains options about access password for administrator and user (*see 6.1.*)

## 16. USING WORK MODES

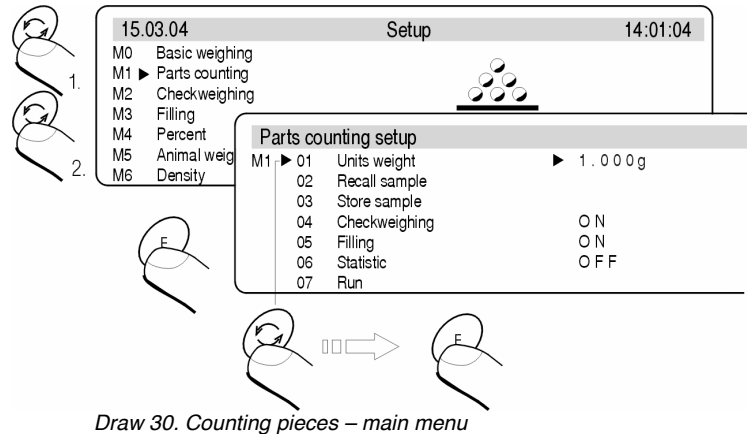
### 16.1. Countign pieces of the same mass

It can be done after write singular piece mass:

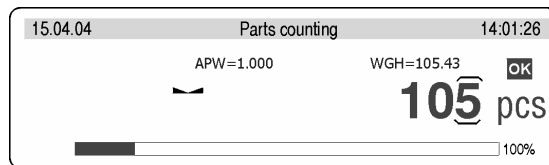
- Write singular piece mass
- Determine singular piece mass on base of standard quantity
- Element selection from date base

#### 16.1.1. Counting pieces after writing piece mass

Start function of counting pieces (drawing No 33).



Set standard mass and press the **ENTER** or select 07 Start and press the **F**. Functions to count details are activated.



APW – singular piece mass [g]  
WGH – all pieces mass on the pan  
pcs – mark for counting pieces

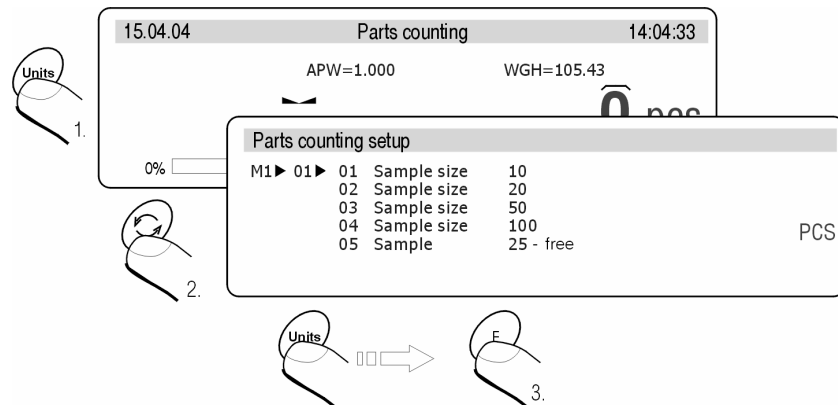
#### Return to weighing

- Press the **MODE** and display shows list of all functions
- Select **MO Weighing**, Press the **F**, display show stage of weighing



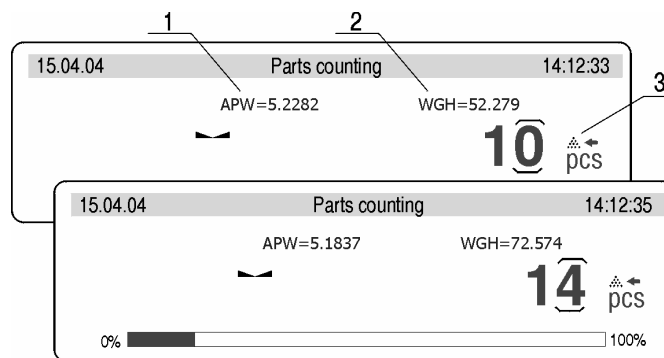
### 16.1.2. Counting through determine singular element mass from the standard batch

Start the procedure of counting pieces in accordance with p. 16.1.1, it does not matter which mass in the field 01. Select **07 Start** and press the key **F**. In the counting pieces function press the key **Units**. Dialog window appears on the display. Select the batch quantity (fields 01 – 04) or write it in 05 – Standard.



Draw 32. Counting pieces with using standard batch

Then press the F key and follow orders presented on the display.



Draw 33. display with AKD function

- 1- single piece mass
- 2- all elements mass
- 3- AKD (automatic correction of preciseness) function

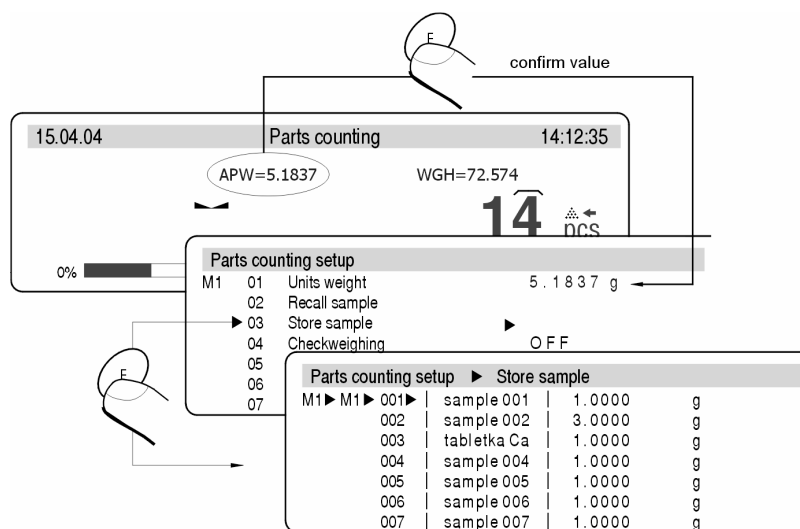
Display shows quantity of pieces which are on the pan (10 pieces). If less than counted actually quantity is added mass of singular piece is corrected. In this case  $APW = 5.2282$  to  $5.1837$ . From this moment following pieces are counted in relation to singular mass.

This way mass of singular piece can be determined on base of batch standard.

### The are four conditions of AKD (Automatic Correction of Preciseness) in the balance software

1. quantity of pieces (after adding) must be higher than it was previously
2. quantity of pieces (after adding) must be less than twice quantity which was on the display before adding
3. actual quantity must be in tolerance  $\pm 0,3$  of the total value,
4. the result must be stable.

If user decides that batch quantity is enough singular piece mass must be introduced into the balanc memory after pressing the key **F**.

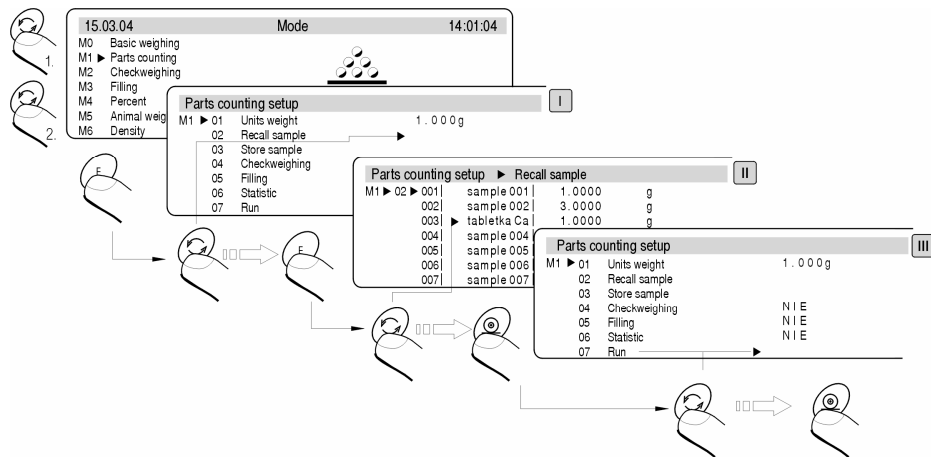


Draw 34. Automatic Correction of Preciseness – record in date base

Select the field and write names of weighed elements. Press the **Enter** (record name) and **Enter** (record value). Next to name singular piece mass should be introduced. It can be remembered using 02 Przyw. wzorca

### 16.1.3. Select piece from date base

Active function of counting pieces as it is shown on below scheme.



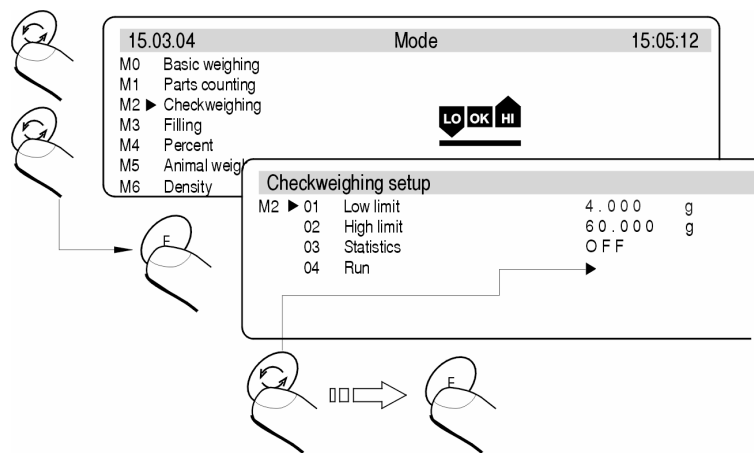
Draw 35. Select piece from date base

Select piece form date base. Start counting pieces.

### 16.2. Checkweighing

The sample is weighed precisely when the limits of weighing are settled. The process is shown (side graphs) and controlled.

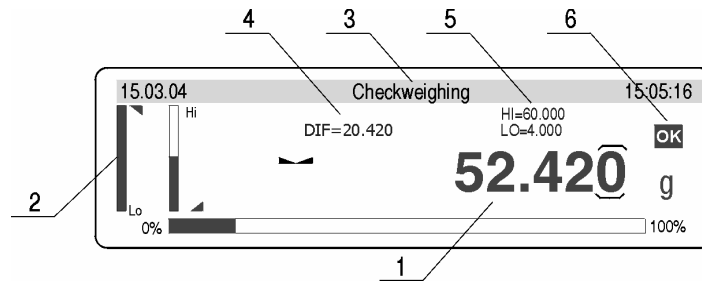
The function activation:



Draw 36. Checkweighing – the function activation



## Display



Draw 37. Checkweighing – display view

- 1 – result
- 2 – bargrafy
- 3 – function name
- 4 – difference between masyw of weighed load and middle of tolerance field (HI/LO)
- 5 – value of low (LO) and (HI) high limit
- 6 – graphs which presents weighign range



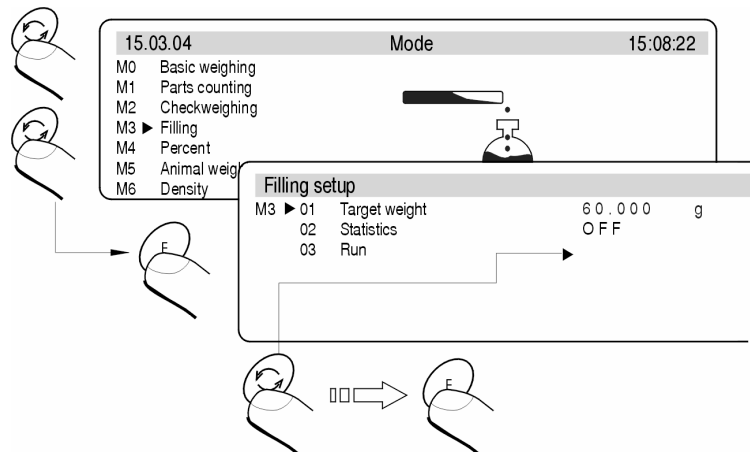
Rememeber to set the parameter  
02 High limit firstly. The balance program checks if the values are correct  
and if they are in measure range.

If settled values of the parameters are incorrect the balance shows command  
about error and returns to setting parameters without changes.

### 16.3. Filling

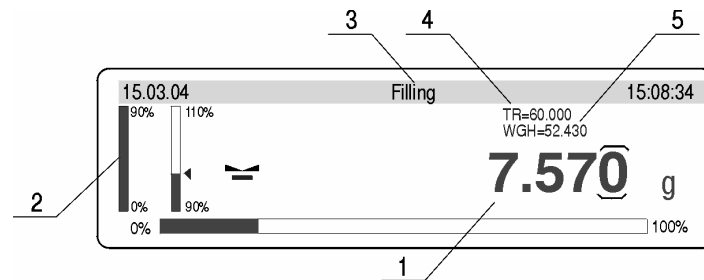
During dosage (pouring) load mass is filled up till the settled mass is reached.  
Before the procedure set the standard mass which is upper stage of the dosage.

#### Activation of the function



Draw 38. Dosage – activation of the function

#### Display



Draw 39. Dosage – display

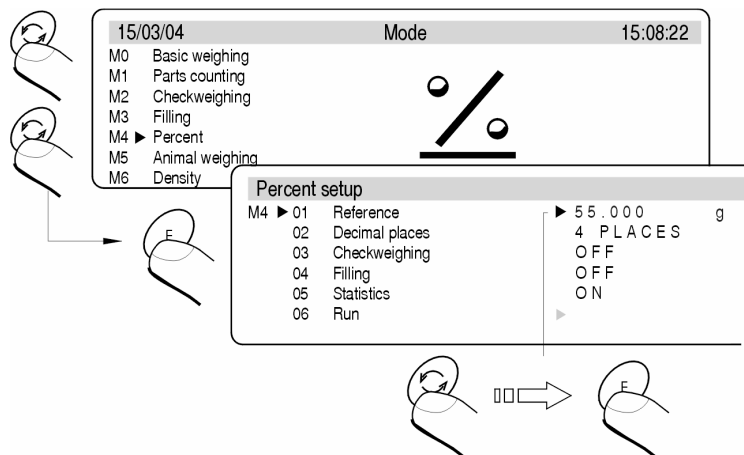
- 1 – mass which should be added
- 2 – graphs
- 3 – function name
- 4 – TR reference value mass which is declared  
(see drawing. 39. M3 01 Reference mass)
- 5 – WGH mass on the pan

## 16.4. Percents

This function compares load mass to standard mass which value should be given. The result of this operation is displayed in percentages.

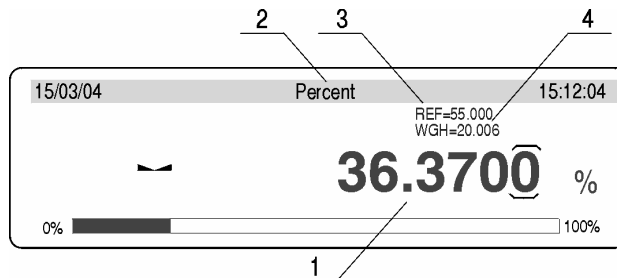
Following functions: dosage, weighing, statistics can cooperate with deviation function.

Activation of the function



Draw 40. Percents – activation of the function

### Display



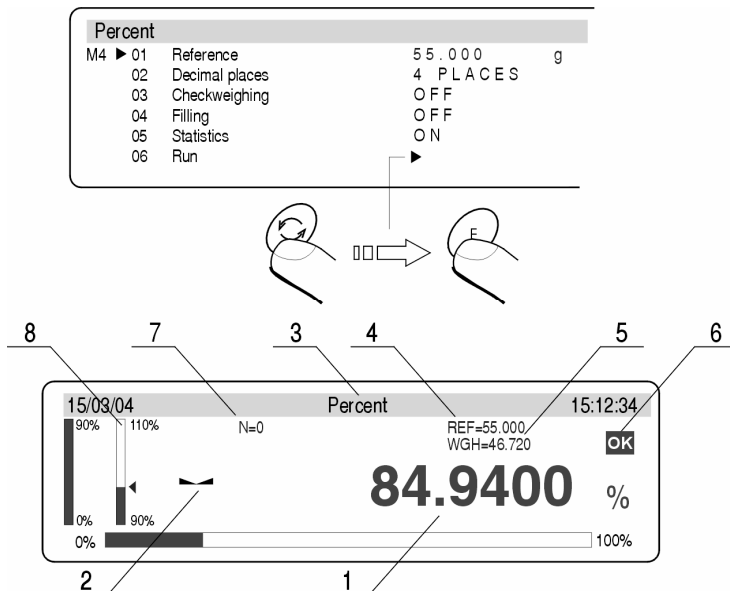
Draw 41. Percents – display

- 1 – percentage value, proportion of the mass on the pan and standard mass
- 2 – function name
- 3 – REF masa odnosienia (see drawing 40 – M4 01)
- 4 – WGH mass on the pan

## Cooperation of the deviations with other functions

During activation of the function set option YES for parameters M4 03, 04, 05.  
Select field START and start work.

- after setting function Dosage YES give up and down stage as % values
- after setting function Dosage YES give the mass value in %
- after selecting Statistics select field Cancel and cancel previous statistics and change the attribute NO into attribute YES. Confirm this option and press the key Enter.

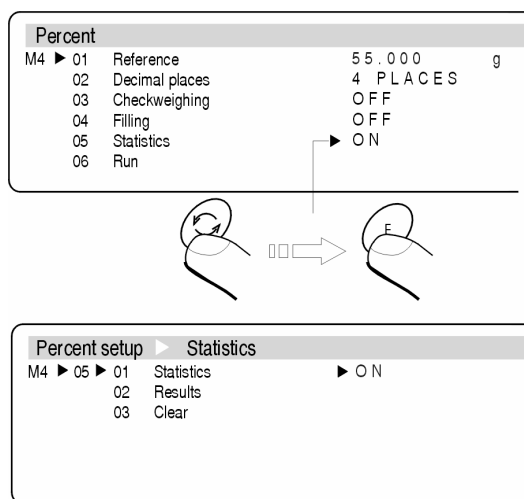


Draw 42. Percents – cooperation with ther functions

- 1 – percentage value relation of the load on the pan to reference mass
- 2 – stable measurement sign
- 3 – function name
- 4 – REF reference mass
- 5 – WGH mass on the pan
- 6 – graph which presents weighign range where the weighing range is
- 7 – statistics (N=0 – no measurements)
- 8 – active function dosage (load mass between 90 – 110%)

After measurements eg. 10 (quantity of measurements N=10) user can see results of statistics of made measurements.

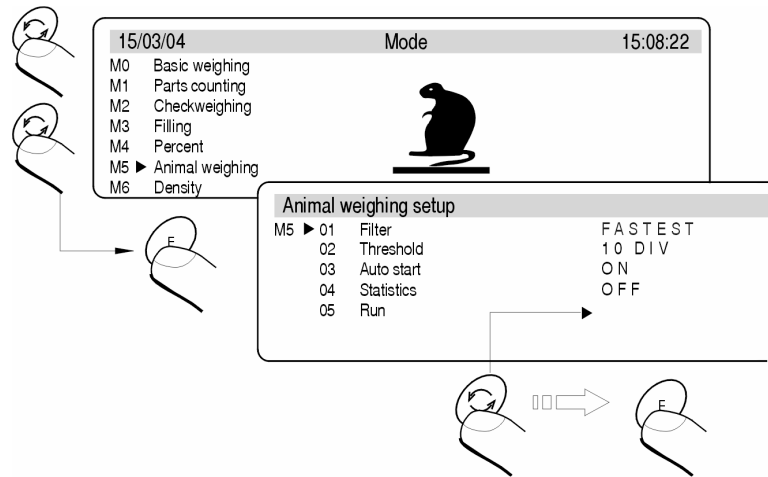
- Enter work mode
- Select the parameter 05 Statistics
- Pressing the F key and enter the parameter 05 Statistics
- Select the parameter 02 Results
- Enter function of showing statistics results
- After pressing the ENTER statistics result can be printed
- Return to statistics submenu and higher levels – key **ESC**



Draw 43. Percents – cooperation with other functions - Statistics

## 16.5. Weighing animals

### Function activation



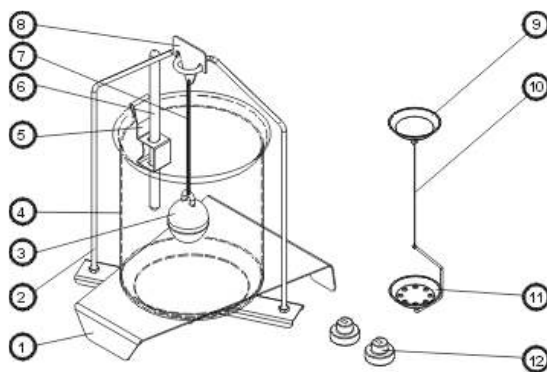
Draw 44. Weighign animals – view of the display

### External setting

- FILTR (Decides how fast final stable result is received, the faster filter the shorter time of measurement)
- STAGE (Value in actual scale intervals is value the result must be below  
The result of weighing must be smaller than value of actual scale intervals  
in order to do following automatic measurement)
- AUTO START (Automatic start up following measurements)
- STATISTICS (Statistics counting for particular subjects)
- START (Start measurements up)

## 16.6. Density of solids and liquids

In additional equipment of analytical balances there are Specific Gravity Measurement Kit.



Draw 45. Specific Gravity Measurement Kit

Components of the kit:

1	Beaker stand	7	String
2	Pan stand	8	Float hook
3	Float	9	Top pan
4	Beaker	10	String
5	Thermometer clamp	11	Bottom pan
6	Termometer	12	Attachments

### 16.6.1. Density of liquids

Basic component during measure solids of liquids is glass float. It has precise determined capacity which is stamped on the float hook. Write password to balance memory before the measurements.

During the measurement of liquid density mass of glass float in the air is compared to its mass in the liquid.

The result is presented on the display automaticaly after its counting by the balance program.

The result can be sent through RS 232 to printer or computer after pressing PRINT key.

### 16.6.2. Density of solids

Density of solids can be determined in one of 3 different liquids:

- WATER (destiled water),
- ALCOHOL (spirit 100% +/- 0.1% at 20 °C),
- OTHER (other liquid with known density)

Measurement of density of solids is based on comparison sample mass in air (weighed on top pan) to the same sample mass in the liquid (on bottom pan).

The programme counts density of sample and displays it on the display. The result can be sent through RS 232 to printer or computer after setting the key PRINT.



Precise description of measurements performance and setting is the manual of Specific Gravity Measurement Kit.



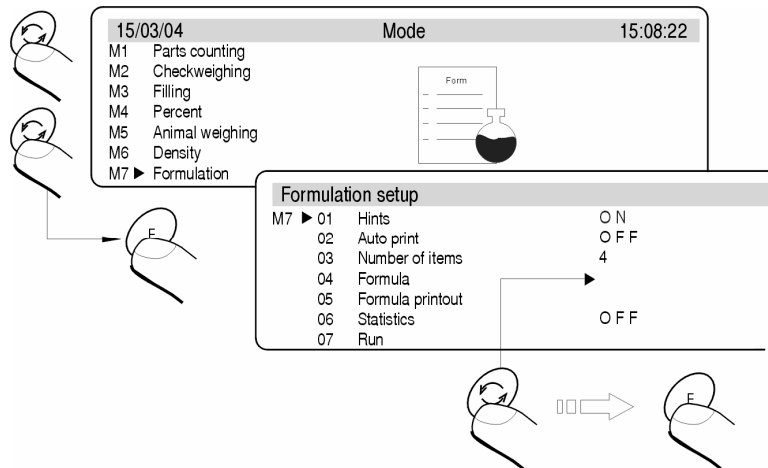
## 16.7. Recipes

This function is used to make mixtures under recipes. This function is recommended to use in drug-stores. The program is equipped with calculate memory. The balance remembers singular component mass and sum of weighed components.

Following information are presented on the display in this work mode:

1. load mass on the pan
2. actual weighed component name (max 10 signs)
3. mass which should be measured for actual weighed component „WGH”
4. quantity of components which is weighed in the mixture „IC”
5. components mass already weighed „SUM”

### The function activation



Draw 46. Recipes – internal setting

parameter 01 Prompts

after set the parameter at YES the balance displays names and singular components mass recorded in the parameter 04 Recipe on the graphic display

#### parameter 02 Automatic printout

after set the parameter at YES the balance sends value on printer or computer through RS port after confirmation mas sof each component

**parameter 03 Quantity of components**

user determines quantity of components the mixture should include (max 20 signs)

**parameter 04 Recipe**

after set this parameter following submenu is displayed. In this submenu user can write names (not more than 10 signs) and set (standard mass) of each component in the mixture

**parameter 05 Recipe printout**

This function prints composition of the mixture on connected printer. There are names and setting of particular component and total contents of the mixture.

**parameter 06 Statistics****parameter 06 01 Statistics**

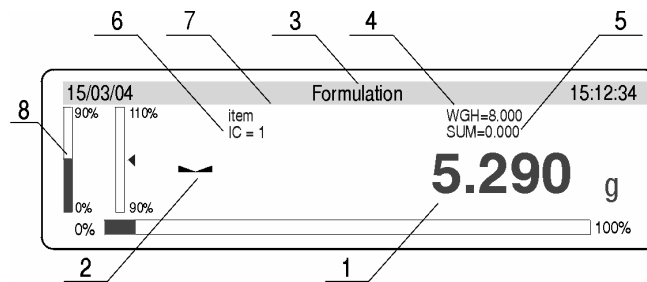
switch on (YES) or switch off (NO) statistic counting

*UWAGA:*

*Statistics counting refers only to total mass of prepared mixtures (singular components mass are not counted).*

**parameter 07 Start**

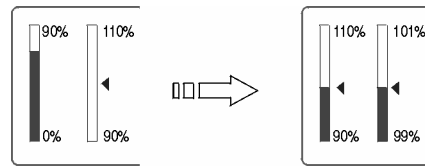
enter work modes Recipes

**Information on the graphic display for recipes**

*Draw 47. Recipes – functions*

- 1 – mass which is actually on the pan.
- 2 – stable measurement sing
- 3 – function name
- 4 – settled mass of the weighed component in the parameter 04 Recipe

- 5 – Sum of weighed components of the mixture which are in calculate memory of the balance
- 6 – quantity of weighed components in the recipe
- 7 – name of weighed component
- 8 – size graphs. Information how much left to gain settled component is presented on these graphs.



Draw 48. graphs – automatical scale

### Procedure of preparing mixtures – according to recorded components and their mass in the balance memory

Write names and components mass in the parameter 04 Recipe. Remember about the dependences:

- there cannot be more than 10 signs
- confirm each name by the **ENTER** key and write mass which will be in the mixture

**Receptury**

M7 ▶ 01 Hints O N

02 Auto print O N

03 Number of items 4

04 Formula →

05 Formula printout O N

06 Statistics

07 Run

press  
Enter

**Formulation setup ▶ Formula**

M7 ▶ 04	001	item	01	8.000	g
	002	item	0 2	12.000	g
	003	skladnik 3		6.000	g
	004	item	04	45.000	g
	005	item	05	1.000	g
	006	item	06	1.000	g
	007	item	07	1.000	g

Draw 49. Declared recipes

- total mass of the mixture together with the container cannot be bigger than max capacity of the balance
  - there cannot be more than 20 components in the mixture
  - Write quantity of components in the parameter 03 Quantity of components
  - Quantity of components cannot be higher than 20 pcs
  - The program records mixture contents in order they were introduced in the parameter 04 Recipes. If user writes 10 components in the parameter 04 Recipes and set 8 for quantity of components the program finishes preparation of the mixture after weighing 8 components.
  - The balance programme creates mixture in order of recorded components in the parameter 04 Recipes and starts from the component 1 and finishes at settled component in the parameter 03 Quantity of components
  - If the documentation is printed set the parameter 02 Automatic printout at 1 : YES. After confirmation of each component (key UNITS) their mass are printed on connected printer or computer.
- 
- Set the parameter 01 Prompts at 1 : YES
  - Enter function Recipes by pressing the ENTER key
  - Tare container mass to the balance memory
  - Weight first component (mass in the WGH)
  - Press the UNITS key. Mass of component 1 is recorded in the balance memory. The information on the display changes: component 2, mass WGH, IC=1, SUM=. . .
  - Information on the display is settle do zero.
  - Repeat it for all components
  - After weighing last component and write its mass to the balance memory (the UNITS key) total mass of mixture and prompts to following steps are displayed.

### **Procedure of making mixtures without recording components and their mass date in the balance memory**

If documentation of preparing mixture is printed set the parameter 02 Printout at 1 : YES.

If mass of each component is confirmed (key UNITS) each mass with their names is printed on connected printer or computer.

- Set the parameter 01 Prompts at the value 0 : NO
- Enter function Recipes by pressing ENTER
- Tare container mass to the balance memory
- Pour component 1 to the container – in relation to information about mixture
- Press the UNITS key. Mass of component 1 is recoded in the balance memory. The information on the display changes: IC=1, SUM=. . . The indication is set to zero. Press the key Units
- Repeat it for all components of the mixture
- After write last component press the **→0/T←**. Procedure of making mixtures is finished. Sum of mixture is kept on the display.

### **Statistics counting**

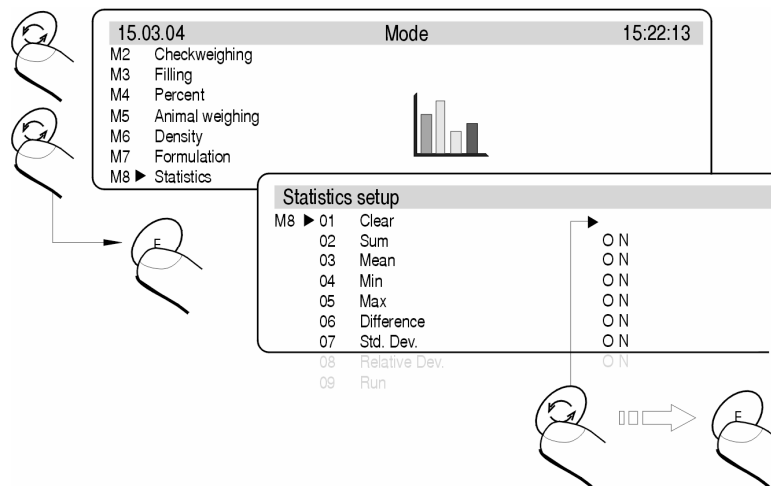
Statistics counting relate only to making mixtures (particular mass components are not included in the counting).

If user performs statistic counting in this work mode:

1. enter the parameter 06 Statistics
2. cancell previous results of statistic counting
3. set the parameter 06 01 Statistics at YES
4. enter work mode for preparing mixtures
5. perform measurement series
6. enter the parameter 06 Statistics again
7. enter the parameter 06 02 Results
8. to print results press the key PRINT

## 16.8. Statistics

### Activation



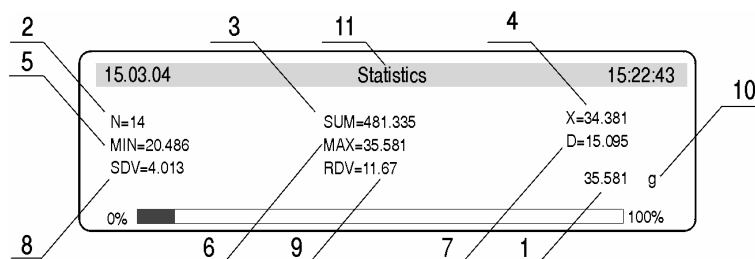
Draw 50. Statistics – function activation

Results of previous statistics should be removed after function activation. It is realized through option **M8 01 Cancel**.

All statistic data are actualized after writing following measurement to the balance memory. Following measurement is written to series after load is put on the pan, stabilization of the result (measure unit is displayed) and after pressing **ENTER**.

User decides what statistic data are presented on the graphic display during measurements by setting their activity in the submenu of work mode (values which are set for YES are active). Independently on setting (YES/ NO), during final result (the key **UNITS**) the printout contains full statistics.

<i>N</i>	:	5	(quantity of weights)
<i>SUM</i>	:	161.121 g	(all components total mass)
<i>X</i>	:	32.224 g	(average mass of weighed components)
<i>MIN</i>	:	20.486 g	(min mass)
<i>MAX</i>	:	35.578 g	(max mass)
<i>D</i>	:	15.092 g	(difference between Max- Min)
<i>SDV</i>	:	6.581 g	(standard deviation)
<i>RDV</i>	:	20.4 %	(variation factor)



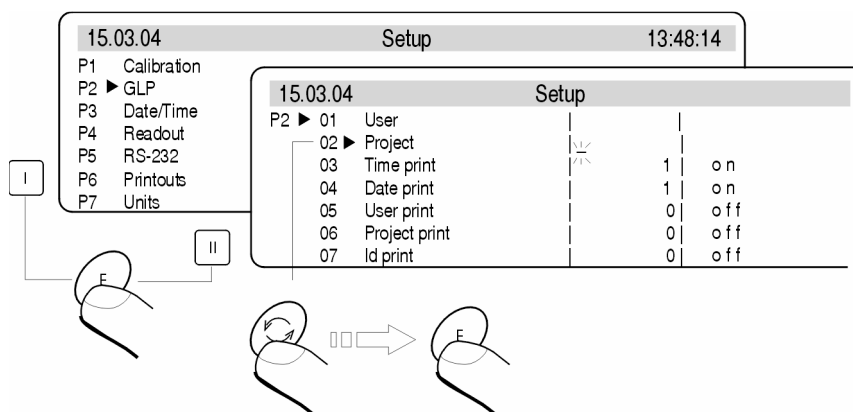
Draw 51. Statistics – display for series of measurement

1. mass on the pan
2. measurement number in measurement series
3. sum of all weighed components in measurement series
4. average mass of weighed components in the series
5. mass of the lightest component in measurement series
6. mass of the heaviest component in measurement series
7. difference between the lightest and the heaviest component in measurement series
8. value of counted standard deviation
9. value of variation factor
10. measure unit [g]
11. work mode

## 17. KINDS OF PRINTOUTS

### 17.1. Standard printout

There are 2 types of printouts. First of them is standard printout. It includes result of weighing and all variables which have attribute YES in GLP submenu. In User and Project fields names should be written.



Draw 52. Declaration of variables to printout – submenu GLP

Example of standard printout

```
Date   : 13/09/2004
Time   : 16:30:50
User Id : Nowak
Project Id : tabletka
Balance Id : 117436
Last calibration:
-----
09/09/2004   12:23
automatic calibration
Diff.:    0.001 g
-----
13.829 g
```

*Draw 53 Example of standard printout  
(all option settled on YES – printed)*

```
Date       : 13/09/2004
User Id    : Nowak
Project Id : tabletka
Balance Id : 117436
13.838 g
```

*Draw 54 Example of standard printout*

Question mark before load mass means that the result is not stable.

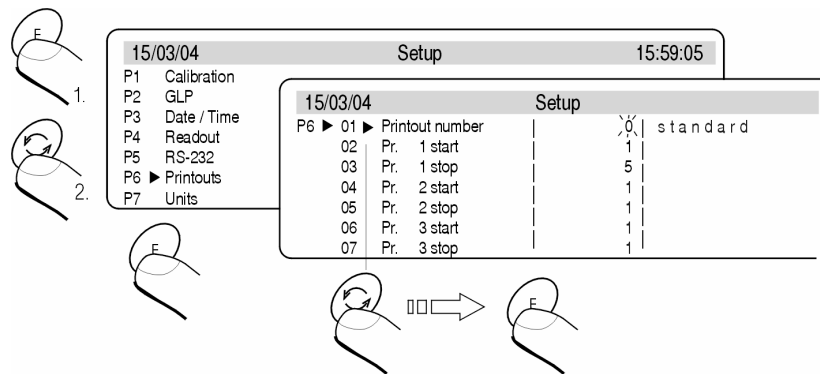


## 17.2. Non-standard printout

Procedure of creating non-standard printouts:

- user can create own 4 printouts,
- give the number of the text which starts the printout eg. Printout 1 Start – 1 and text number which finishes the printout eg. Printout 1 Stop – 40. In this case texts from 1 to 40 are printed.
- And then write text in the lines  $1 \div 40$ .  
It is recommended to use PC keyboard what is simpler and faster way.
- Non-standard printouts can overlap each other:  
Printout 1 Start – 1  
Printout 1 Stop – 40  
Printout 2 Start – 20  
Printout 2 Stop – 40
- **Non-standard printout can be created by Edition of the printout.**

During manual writing give all special signs as CR LF, tabulator etc. If function Printout Edition is used all these values can be selected in form of ready elements. They are transmitted from one side **Line of selection** to the other window **Printout**



Draw 55. Menu printouts – the function activation

**Non-standard printout can include:**

- Variable dependently on work mode and other user necessities (mass, date, Project No)
- Stable texts in user menu
- Non-standard printout can include not more than 640 signs recorded as 80 texts 8 signs each (from the parameter Text 1 to Text 80). User can design 4 non-standard printouts

### 17.2.1 Texts

#### Variables in all modes and with the same values

%%	Printout of „%” singular sign
%N	Actual net mass in basic unit
%d	Actual date
%t	Actual time
%i	The balance number
%R	The program number
%P	The Project number
%U	The user number
%F	Actual function name – work mode
%C	Date and time of last calibration
%K	Kind of last calibration
%l	Deviation of last calibration
%1	Code 1
%2	Code 2
%3	Code 3
%4	Code 4
%5	Code 5
%6	Code 6

#### Variables dependent on used work mode

Variable	Description	Mod where the variable is active
%W	1 piece mass	COUNTING PIECES
%H	Top stage	WEIGHING
%L	Down Stage	
%Z	Standard mass	DOSAGE
%B	Reference mass	DEVIATIONS
%A	Filter	WEIGHING ANIMALS
%b	Stage	
%i	Liquid	MEASUREMENT OF DENSITY
%p	Procedure	
%c	Temperature	
%a	Density of liquid	
%v	Float capacity	

### Statistic variables in all modes apart from basic weighing

%n	The measurement number
%x	Average value
%S	Sum
%m	Min value
%M	Max value
%D	Difference between max and min value
%s	Standard deviation
%r	Variation factor

### Variable in all modes which value depends on the mode

%V – Mass in actual unit. Value connected to work mode eg. counting pieces for mode Counting pieces or deviation from standard mass in % for mode Deviation

### Special signs used to create special printouts

\\	Singular sign „\”
\c	CRLF
\r	CR
\n	LF
\t	Tabulator
\s	skip to next „string”
\0	End of the printout

Each text (Text 1 ÷ 89 Text 80) can include max 8 signs (letters, digits, special signs, spaces). To write long sentence create it using 8 signs texts. User can use special signs to include variables dependly on own necessities.

**Example 1:**

Max mass cannot be higher than 11.250 g!

If user write this sentence uses 46 signs grouped in adjacent lines of the text. Set up following texts and write 8 signs in each of them untill the sentence finishes.

Parameter number	Text							
	1	2	3	4	5	6	7	8
19 Text 10	M	a	s	a		m	a	k
20 Text 11	s	y	m	a	l	n	a	
21 Text 12	n	i	e		m	o	ż	e
22 Text 13	p	r	z	e	k	r	a	c
23 Text 14	z	a	ć		1	1	.	2
24 Text 15	5	5	0		g	!		

**Example 2:**

Zakład Mechaniki Precyzyjnej „RADWAG”

Date:

Time:

Load mass:






\*\*\*\*\*Signature:\*\*\*\*\*

\*\*\*<actual work mode>\*\*\*

Set following texts and write 8 signs in each of them untill it is finished.

Parameter number	Text							
	1	2	3	4	5	6	7	8
25 Text 16	Z	a	k	ł	a	d		M
26 Text 17	e	c	h	a	n	i	k	i
27 Text 18		P	r	e	c	y	z	y
28 Text 19	j	n	e	j		„	R	A
29 Text 20	D	W	A	G	„	\	c	D
30 Text 21	a	t	a	:	%	d	\	c
31 Text 22	G	o	d	z	i	n	a	:
32 Text 23	%	t	\	r	\	n	M	a
33 Text 24	s	a		ł	a	d	u	n
34 Text 25	k	u	:	%	N	\	c	\
35 Text 26	c	*	*	*	*	*	P	o
36 Text 27	d	p	i	s	:	.	.	.
37 Text 28	.	.	.	.	.	.	.	\
38 Text 29	c	*	*	*	%	F	*	*
39 Text 30	*							

– **On the balance desk**

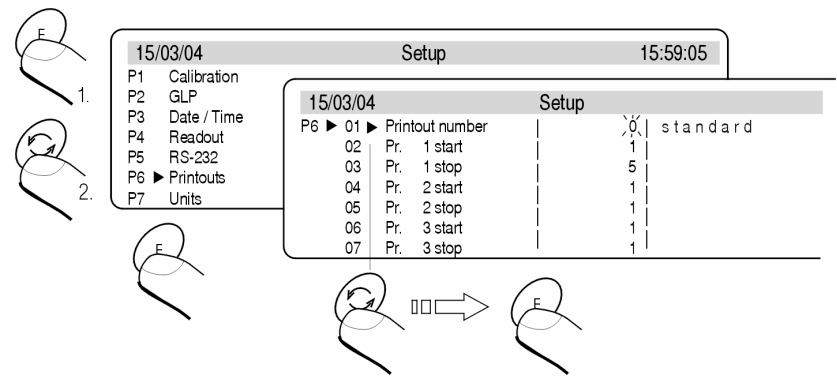
	Move up through digits, letters and signs 0 1
	Move down through digits, letters and signs 0 1
	Determine sign to change and move right (if the key is pressed flashing sign is moved in right direction. If no sign is written this key makes space in the text)
	Determine sign to change and move left (after this key is pressed flashing sign is cancelled)
	Confirm the text

– **On PS/2 keyboard**

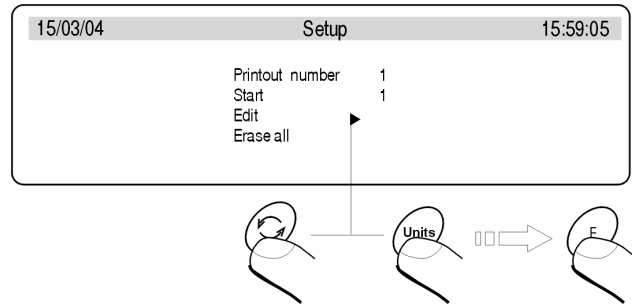
Press F2 to enter main menu. Press F3 to set parameters indications next to group P6 Printouts and press F2 to enter menu group and then select parameter. Press F2 to activate the procedure of writing the text. By means of keyboard write the text (max 8 signs) and confirm by Enter. Repeat this procedure for the rest of the texts.  
Description of the computer keyboard is in the p. 5.1.3

17.2.2. Composing texts by Edition function

The function activation

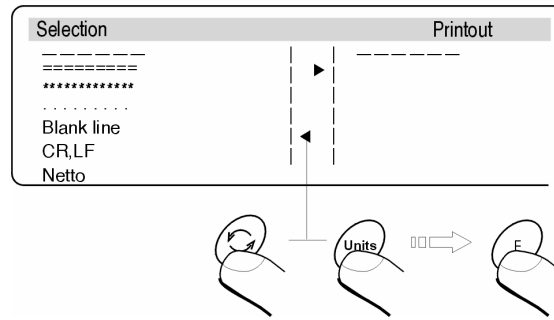


Draw 56. Not standard printouts – printout edition



Draw 56-1. Not standard printouts – printout edition – select

After activation of the function select printout number (1-4) and beginning of writing the texts in (range from text 1 to text 80). Then select the option Edition to edite (create) printout or cancell all (remove all printouts).



Draw 57. Edition of printouts – selection of the elements

To select following fields use keys **Units** and **Mode**. To print field press the F key. After the edition press ENTER/PRINT. Display shows question if printout should be done – press ENTER/PRINT again.

### 17.2.3 select non-standard printouts

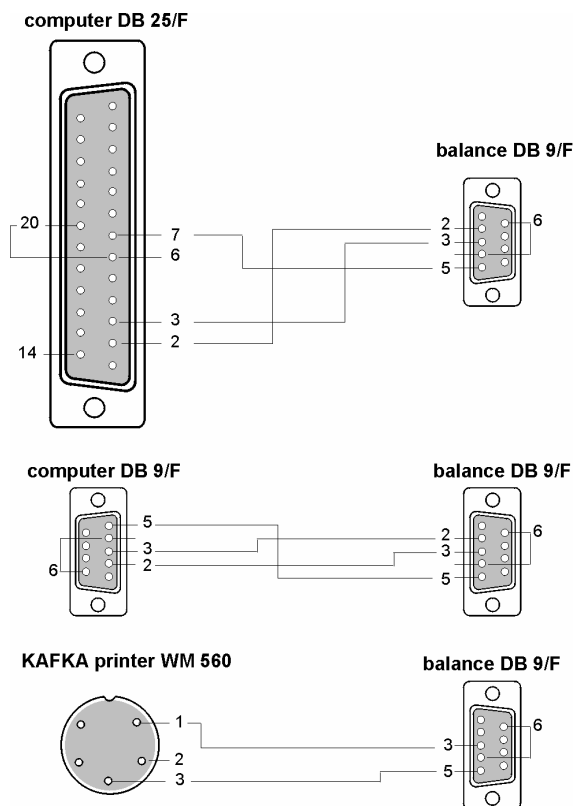
if STANDARD printout is selected – there will be only result and variables declared in the GLP (see p. 17.1 Standard printout - drawing 52. Declaration of the variables to printout – submenu GLP).

If non-standard printout is printed select kind of the printout (1-4) and give the beginning and end of the printout.

## 18. COOPERATION WITH PRINTER OR COMPUTER

To send indication on the display with measure units to the computer or printer press the key < **PRINT** >. The speed of transmission 9600 bit/s is settled automatically. If external instrument has different speed of transmission change speed of transmission in the balance menu. (see p. 13 of the manual)

### 18.1. Connections



Draw 58. Connections balance - computer

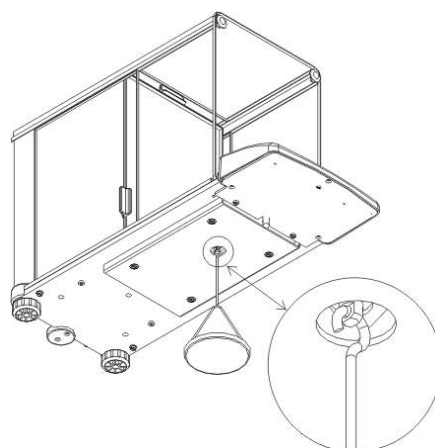


The balance connection DB 9/F – The computer connection DB 9/F (with control of sending date)

<u>Balance</u>	<u>Computer</u>
2 (RxD)	3 (TxD)
3 (TxD)	2 (RxD)
4 (DTR)	6 DSR
5 (GND)	5 (GND)
6 (DSR)	6 (DTR)
7 (RTS)	8 (CTS)
8 (CTS)	7 (RTS)

## 19. WEIGHING LOADS UNDER THE BALANCE

In standard version of CX series it is possible to weight loads under the balance. To use this function:



*Draw 59. Weighing under analytical balance*

Remove the lid in the balance bottom. There is suspension in the hole in the balance bottom. It is installed in the balance construction immobile. Hook proper hook in the hole (it is not part of accesories). Weight on the hook.



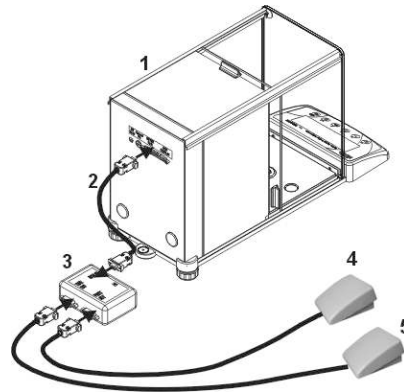
1. Suspended load cannot be turned. The mechanism can be damaged.
2. mass of all suspended accesories should be set to zero after pressing **TARE**.

## 20. CONNECTING ADDITIONAL KEYS

It is possible to connect external tare and print buttons by special luster through port RS232.

Printer or computer can be connected to the cluster.  
Connected elements are not standard accesories of the balance.

1. balance
2. cable which connects balance with cluster
3. cluster
4. button TARA
5. button PRINT



*Draw 60. Connection of the external keys TARE / PRINT*

## 21. LIST OF COMMUNICATIONS COMPUTER - BALANCE

Function	RESET INTERFACE
Command	R CR LF (zero actual orders, restore factory setting)
Function	SEND ALL COMMANDS FROM THE BALANCE
Command	PC CR LF (all recorded information in commands in the balance programme are sent from the balance)
Function	SEND THE RESULT IN BASIC UNIT
Command	S CR LF (result is sent from the balance in basic interval after stability)
Function	SEND RESULT IN BASIC UNIT IMMEDIATELY
Command	SI CR LF
Function	SEND THE RESULT IN ACTUAL INTERVAL
Command	SU CR LF (result in actual unit is sent from the balance after stability)
Function	SEND RESULT IN ACTUAL INTERVAL IMMEDIATELY
Command	SUI CR LF
Function	ZERO THE BALANCE
Command	Z CR LF (set the balance to zero after it reaches stability)
Function	ZERO IMMEDIATELY
Command	ZI CR LF
Function	TARE WHEN STABLE
Command	T CR LF
Function	TARE THE BALANCE IMMEDIATELY
Command	TI CR LF
Function	SWITCH CONSTANCE TRANSMISSION OFF IN BASIC INTERVAL
Command	C0 CR LF
Function	SWITCH CONSTANCE TRANSMISSION IN BASIC INTERVAL
Command	C1 CR LF
Function	SWITCH CONSTANCE TRANSMISSION OFF IN ACTUAL INTERVAL
Command	CU0 CR LF
Function	SWITCH CONSTANCE TRANSMISSION ON IN ACTUAL INTERVAL
Command	CU1 CR LF

Function Command	NUMBER OF THE BALANCE NB CR LF
Function Command	RANGE OF WEIGHING FS CR LF
Function Command	PROGRAM VERSION RV CR LF
Function Command	WRITE OR CHANGE DATE IN THE BALANCE PD CR LF (the balance sends settled date or the date is changed)
Function Command	WRITE NEW OR CHANGE TIME IN THE BALANCE PD CR LF (the balance sends settled time or this time is changed)
Function Command	WRITE ACTUAL WORK MODE PM CR LF
Function Command	SEND SETUP PS CR LF (all balance setup is sent – printout of the parameters)
Function Command	SOUND SIGNAL – „BEEP“ B CR LF (sound beep is switched on)
Function Command	SEND LAST ERROR CODE ER CR LF (last order of the error is sent)
Function Command	DISPLAY STRING DS CR LF (signs are shown on the display)
Function Command	CANCEL STRING CS CR LF (cancels string and restores previous state of the display)
Function Command	DISPLAY HEADLINE DH CR LF (signs are displayed in top headline of the display)
Function Command	CANCEL HEADLINE CH CR LF (cancels information in the top headline)
Function Command	CANCEL HEADLINE DF CR LF (displays signs in the bottom headline)

Function	CANCEL HEADLINE
Command	CF CR LF (cancels information in bottom headline)

Function	PERFORM INTERNAL CALIBRATION
Command	CL CR LF

Function	BLOCK THE KEYBOARD
Command	KL CR LF

Function	UNBLOCK THE KEYBOARD
Command	KU CR LF

Function	SWITCH „ECHO“ OFF FOR THE KEYBOARD
Command	E0 CR LF (keys codes are switched off)

Function	SWITCH „ECHO“ ON FOR THE KEYBOARD
Command	E1 CR LF

Function	SWITCH THE BALANCE OFF
Command	O0 CR LF (the same as ON/OFF)

Function	SWITCH THE BALANCE ON
Command	O1 CR LF (the same as ON/OFF)

Function	SWITCH AUTOZERO OFF
Command	A0 CR LF

Function	SWITCH AUTOZERO ON
Command	A1 CR LF

If command which is not listed or with error and with CRLF at the end the command is returned in E S CR LF form. Spaces in the forms should be omitted ,

## 22. TECHNICAL PARAMETERS

Type	CX 165	CX 265
Max capacity	100/160g	60/220g
Min capacity	1mg	1mg
Accuracy	0,01/0,1mg	0,01/0,1mg
Verification scale interval	1mg	1mg
Tare range	- 160g	- 220g
Linearity	±0,1/ 0,2mg	±0,1/ 0,2mg
Pan	Ø 85	Ø 85
Stabilization time	8/4s	
Repeatability	0,1/ 0,2mg	0,1/ 0,2mg
Dryft of sensitivity temperature	2ppm/°C in temp. 15 °C - 30 °C	
Temperature	+ 18 °C - + 30 °C	
Power supply	230 V , 50 Hz, 8VA	
OIML class	I	

## 23. COMMANDS ABOUT ERRORS

Order	Error number	Error description
"control sum error"	<b>1.1</b>	Errors during data transmission
"A/D Error"	<b>1.2</b>	Converter error
"Exceed range"	<b>2.1</b>	Exceed max measure range of the balance
" Exceed range "	<b>2.2</b>	Exceed max measure range of the balance
"A/D Null"	<b>2.3</b>	No divisions from converter
"A/D Full"	<b>2.4</b>	Exceed max value converter intervals
"Tara/Zero above the range"	<b>2.5</b>	Exceed admissible tare or zero value
"Tara above the range "	<b>2.6</b>	Exceed admissible tare value for the balances
"Zero above the range"	<b>2.7</b>	Exceed zero range for the balances
"Result > 4% Max"	<b>2.8</b>	To high start mass (start the balance up with load on the pan)
"Result > 1% Max"	<b>2.9</b>	Difference between determined calibration mass and calibration mass recorded in the balance memory higher than (difference >1%)
"Piece < 1 Div"	<b>2.10</b>	Singular mass value in counting pieces function less than actual scale interval
Piece < 10 Div"	<b>2.11</b>	Mass on the pan during determining mass of singular piece in the function of counting pieces less than 10 actual scale intervals
"Ref < 1000 Div"	<b>2.12</b>	Value of reference mass in the function deviations is less than 1000 actual scale intervals
"above the range"	<b>3.1</b>	The parameter value above the range
"Faulty value"	<b>3.2</b>	Inadmissible value of the parameter
"Blocked - DRH"	<b>3.3</b>	The parameter cannot be changed (Function <b>DRH</b> active in the factory menu)
"Reading error"	<b>4.1</b>	Errors during data transmission to sprinter or computer
" Party error"	<b>4.2</b>	
" Frame error"	<b>4.3</b>	
"stopped transmission CTS"	<b>4.4</b>	
" stopped transmission XOFF"	<b>4.5</b>	
"incorrect date"	<b>5.1</b>	Faulty date
"Exceed time"	<b>6.1</b>	Exceed admissible time during for an operation (eg. zero)

